

Skin graft management for burn patients

A clinical guide

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The information is not a substitute for healthcare providers' professional judgement.

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Introduction

This document was designed to accompany the *Burn Patient Management* and the *Donor Site Management for Burn Patients* documents. It provides specific skin grafting management advice and direction. All of these documents were designed to complement relevant clinical knowledge and the care and management techniques required for effective patient management. Clinicians working outside a specialist burn unit are encouraged to liaise closely with their colleagues within the specialist units for advice and support in burn patient management, including follow-up care post-discharge.

This document will be reviewed every five years, or more frequently if indicated, and updated as required with current information at that time.

Definitions

Skin graft

A skin graft is a common surgical procedure in which the graft, a thin shaving of skin harvested from the epidermal and dermal tissue, is used to provide cover to replace a defect elsewhere on the body. These can be used for covering areas of burn or other loss such as trauma, skin tear or lesion removal.¹ Skin grafts can be split thickness or full thickness. This is usually done in operating theatres with the patient anaesthetised.

Wounds with skin loss affecting the deep dermal, subcutaneous fat layer and muscle tissue, require a skin graft to assist with healing. For example, burn wounds considered deep dermal to full thickness (Figure 1), would require a skin graft to facilitate healing and reduce scar and contracture formation.² There are circumstances when the patient is unable to have skin grafting procedures due to comorbidities that prevent safe anaesthesia.

Early excision and grafting is considered to be the most appropriate management for deeper burn injuries.²⁻⁵ This is for a multitude of reasons, including faster wound healing and better aesthetic outcomes, in addition to reduced complications and decreased length of hospital stay.^{3,6,7}

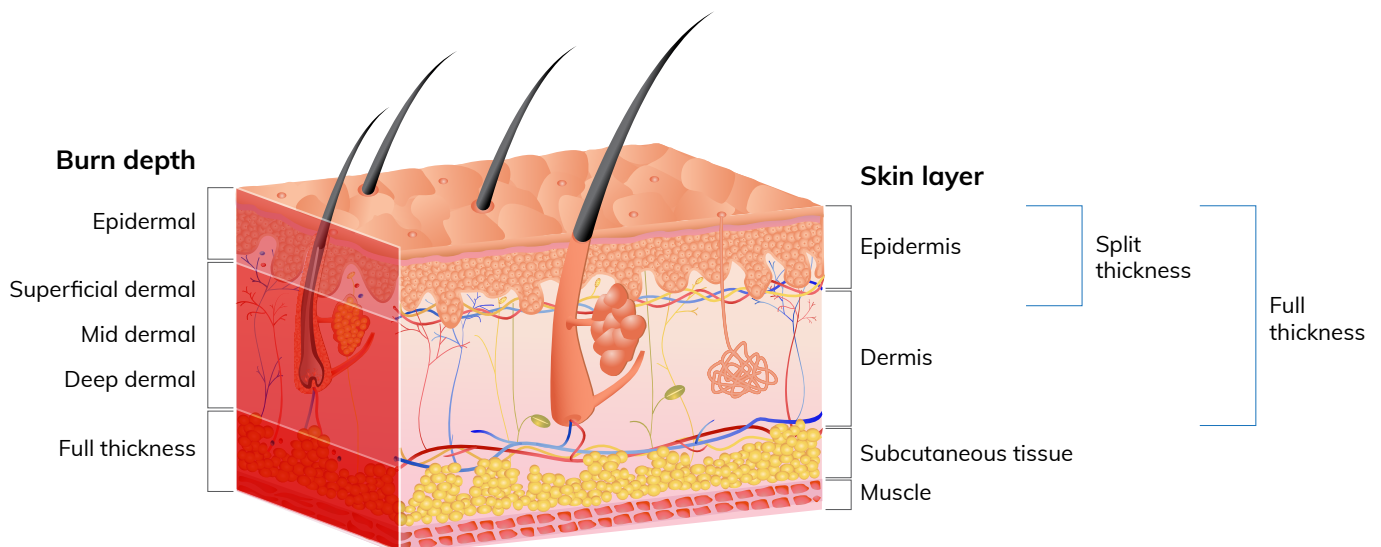
Autograft, allograft and xenograft

For most patients, the use of autograft or their own skin, is the most appropriate due to skin being an organ and thus prone to rejection if an alternative is used. However, for those patients with very large percentage total body surface area burns and little available donor skin, the use of an alternative may be required as a temporary skin substitute.

Alternatives to autografts include allografts and xenografts. Allografts are grafts from the same species and can include cadaveric or 'living donor' from a relative or other person. A xenograft is a tissue graft from another species, such as porcine, bovine or shark. This is usually material from these species impregnated into a dressing material.

Burn skin depth

Figure 1: Burn skin depth diagram



Skin grafting in operating theatre

Harvesting donor skin

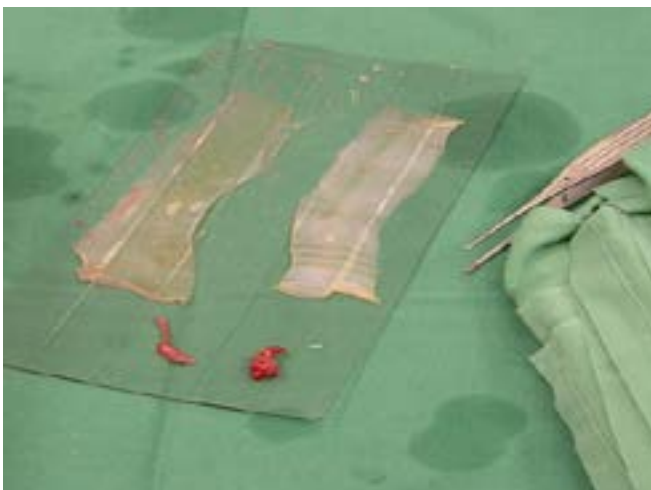
The required skin is removed either with a blade or more commonly with an electronic surgical cutting tool called a dermatome.^{3,6} The dermatome has multiple depth settings and can take a very thin

shaving of skin. For further information regarding donor sites, see the *Donor Site Management for Burn Patients* document.

Figure 2: Taking donor skin with dermatome



Figure 3: Donor skin ready for application



Once the skin has been harvested it is laid flat with the moist side facing upwards ready for application onto the graft site.

Mesh vs sheet

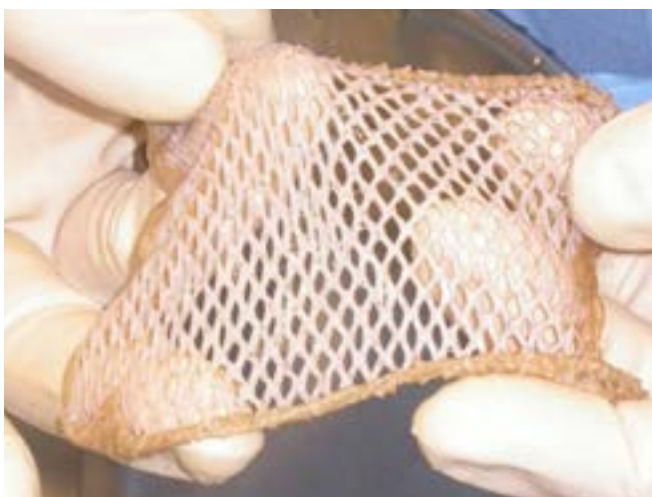
If the area to cover is large, or the surgeon wants to reduce the size of the donor site, the donor skin is meshed using a meshing tool or blade.¹ This involves tiny slits being made throughout the skin so that it

can stretch and cover a larger surface area (Figure 4 and Figure 5).

Figure 4: Skin meshing



Figure 5: Meshed skin



Debriding graft site

Prior to grafting, the wound bed is cleaned and necrotic tissue or eschar is removed. The area is debrided to a bleeding wound bed to encourage optimum graft survival.^{1,2} Debridement may be carried out in numerous ways, including excising, or cutting away dead tissue using a surgical blade or a hydrodebridement tool such as the Versajet®. This excision can include a tangential excision, where the eschar is taken off in thin slices, or

fascial excision, where the eschar and subcutaneous fat is removed to the deep fascia level.¹ The debridement method can be related to the available equipment or the depth of the burn wound. Some small or linear burns can be excised and primarily closed without needing a skin graft (Figure 6).

Achieve intraoperative haemostasis prior to graft application. This may include tumescence, topical adrenalin, tourniquets, diathermy, pressure bandages and elevation.

Figure 6: Debrided wound bed ready for graft application



Excision and primary closure

Skin application

In the operating theatre

The donor skin is applied to the debrided wound bed, dermis side (wet side) facing down onto wound bed, making sure that all areas are suitably covered.

Outside the operating theatre

Skin grafting generally occurs in the operating theatre after the donor skin has been taken. However, sometimes more donor skin is taken than is applied during the operation. If at the first dressing change post-graft the burn wound is not sufficiently covered following surgery the excess donor skin can be laid on the prepared wound bed (cleaned and vascular wound bed) in the ward area for up to 7 days post harvest. When applying the skin the 'shiny' or moist side should be placed face down onto the wound surface using a sterile technique. Skin should be stabilised using glue or adhesive dressing such as retention tape or wound closure strips. The skin graft must be appropriately managed and cared for following the procedure.

Figure 7: Applying donor skin



The graft skin is attached using either skin glue, staples, sutures or an adhesive dressing. The selection is dependent on graft site requirements and the surgeon's preference.

Figure 8: Graft in place



Dressing procedure in the operating theatre

Aim

- To allow the skin graft to heal through the body's own process of re-epithelialisation
- To apply most appropriate dressing using the correct technique
- To apply dressing in timely manner to avoid hypothermia, excess pain or trauma
- To maintain an aseptic technique at all times

Procedure

- Once skin has been applied to graft site, appropriate fixation is applied, e.g. glue, staples, sutures or adhesive dressing. A topical negative pressure (TNP) dressing can also be used to assist fixation and graft take.
- When the graft has been fixed in place, the graft site is dressed with an appropriate dressing such as an impregnated gauze or silicone dressing.
- Ensure the area is cleaned using a sterile technique.
- Ensure any build-up of blood or fluid under the graft has been evacuated to reduce the risk of graft failure.
- Apply the primary dressing directly to the graft site. The primary dressing should have a 2-5cm overlap and border. It is important to cover the whole area, on and slightly around the wound site, to allow for movement and shrinkage.
- Apply a suitable dry absorbent secondary dressing such as a pad or foam dressing.
- Secondary dressings must not come into contact with the graft site as they may adhere and cause trauma on removal.
- Use a fixation dressing such as an adhesive tape to secure the dressing.
- For grafts to extremities, consider immobilisation to reduce graft movement and friction. Immobilisation can be achieved with splinting materials such as thermoplastic, plaster of paris, fibreglass or topical negative pressure.

Important

Care must be taken not to tightly wrap primary dressings circumferentially around the burns.

Graft site dressing

Selecting the most appropriate dressing for a wound can be challenging and graft sites are no exception. There are many different opinions of which is the most appropriate dressing for these wounds.

The aim of a graft site dressing is to protect the wound from shearing forces, support epithelialisation and enhance skin grafting vascularisation. Although the graft is secured at application, a good supportive dressing is required to ensure graft 'take' when vascularisation occurs.

Any infection to the site must be cleansed and dressed appropriately.

Topical Negative Pressure (TNP)

Topical negative pressure (TNP) is a special vacuum dressing that may help regenerate wound tissue, to temporarily close an open wound or to help hold a new skin graft in place.

The dressing and vacuum machine generally stays in place 3 to 7 days. The dressing must have a good seal completely around the dressing using adhesive drapes provided with dressing, or appropriate alternative.

Troubleshooting tips for using TNP:

- Make sure the machine stays on a stable, flat surface.
- If an alarm sounds, look at the screen of the machine to see what it is alarming for and follow any instructions.
- Do not remove any dressings unless instructed to do so by a specialist clinician.
- If you have any continued problems, please call your hospital or the company helpline.

Dressing removal

Aim

- Observe skin graft progress.
- Provide appropriate management for level of healing.

Taking graft site dressing down at day 3 to 7 post-operation

- Ensure appropriate analgesia is administered with adequate time to take effect prior to procedure.
- Skin graft dressings should be fully taken down and the skin graft site assessed within this timeframe unless otherwise advised by an appropriate specialist clinician.
- Ensure appropriate multidisciplinary team members are present for the procedure.
- Remove dressing, taking care not to pull off the graft in the process.
- The graft should be reviewed by appropriate clinical staff and a wound management plan should be formulated.
- Take digital images for clinicians who are unable to attend procedure.
- Monitor wound progress.

Figure 9: Dressing removal



Dressing application

- The graft site should be re-dressed using principles discussed in *Burn Patient Management* document.
- Apply moisturiser to healed areas.
- Apply appropriate dressing for moist wound healing to any open areas. Apply antimicrobial if an infection is present.

Graft healed

If the skin is intact, well vascularised and there are no moist areas:

- discuss scar management with a therapist (e.g. physiotherapist or occupational therapist)
- apply moisturiser if an adhesive is not being applied
- apply appropriate pressure dressing or garment.

Graft is unhealed but present

If the skin graft is present and vascularised but remains moist and not healed:

- dress with impregnated gauze or silicone dressing
- apply appropriate secondary dressing and fixation.

Graft is lost

If the skin graft is not visible on wound surface or it is visible but not vascularised (the wound is raw and unhealed), assess for causative factors such as infection or friction and treat accordingly.

If infection is suspected, swab the wound and send for culture. Clean the wound bed thoroughly and apply silver or other antimicrobial dressing, a secondary dressing and fixation.

For graft loss due to friction, apply appropriate primary, secondary and fixation dressings and ensure friction does not continue to occur. If friction is caused by scratching due to itch, arrange for appropriate medication such as antihistamines. If it is caused by proximity to other body surfaces, dress the wound well with protective and padded dressing.

Moisturising

Once epithelialisation has occurred and the wound is healed, the wound bed will often become dry. This is due to disturbance in the sebaceous glands which lubricate the skin. If left dry, the wound will become itchy and the patient is likely to scratch off the recently epithelialised skin. This will lead to open or raw areas.

To prevent this from occurring, it is recommended that all burns have moisturiser applied to any healed wound if adhesive dressing is not being used for scar management. Massage a small amount of non-perfumed moisturiser, such as sorbolene into the skin until it is fully absorbed. This should be done three to five times per day to avoid the skin becoming dry and itchy.

Sun care

Avoid the sun as the new skin is fragile and will burn more easily. Wear protective clothing and a hat, sun cream if outside.

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Acknowledgements

These documents were developed by the members of the multidisciplinary team of the ACI Statewide Burn Injury Service (from Royal North Shore Hospital, Concord Repatriation General Hospital and The Children's Hospital at Westmead).

Methodology

This document was originally developed in 2006 by members of the ACI Statewide Burn Injury Service (then GMCT), in consultation with clinicians from the three NSW burn units. It was created using evidence and clinical opinion from specialist burn clinicians. The document has been updated several times since creation in consultation with burn clinicians, and at each review the authors identified and reviewed relevant published research. Searches using Medline, *Burns* journal and ClinicalKey were conducted using search terms including (burn[title/abstract] AND/OR skin graft[title/abstract] OR donor site[title/abstract] OR dressing[title/abstract]). The most recent search was conducted in May 2020.

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